

Onboard Blackbody Calibrator Component Development for IR Remote Sensing Instrumentation

Completed Technology Project (2011 - 2012)



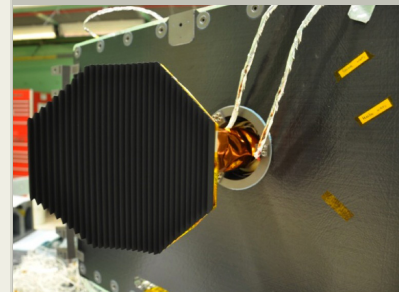
Project Introduction

The objective of this study is to apply and to provide a reliable, stable durable onboard blackbody calibrator to future Earth Science missions by infusing the new technology of carbon nanotubes. Stability and reliability of a blackbody are important for validating the radiometric performance of the instrument post launch while it is collecting data. The end product of this study is a carbon nanotube blackbody calibrator.

We plan to develop a blackbody coated with Carbon nanotube materials that will able to operate in the temperature ranges need to calibrate a thermal infrared sensor for Earth Science missions. The carbon based nanotube material, developed through the NASA GSFC IRAD, will be evaluated as a surface treatment for onboard blackbody calibrators (OBCs). The aforementioned material can reduce stray light that can be introduced into an instrument from an OBC and effect the integrity of the data at is be collected. Also, a sufficiently uniform coating will simplify the geometry of the target, which reduces development time, manufacturing time, and cost of the OBC. Silicon has been determined to be an acceptable growth medium for the carbon nanotube coating. We will evaluate the effect of the paint/substrate layer thickness will have on the thermal gradient to see if we get the desired emissivity. Also, we want to verify that the thermal mass is sufficient to hold a stable thermal temperature. Once the OBC system is defined, a ray trace study will be conducted to assess the emissivity off the blackbody and the irradiance. The final product, an OBC performance model, could eventually be used as a tool to size a blackbody calibrator for future missions, such as a thermal imager for a future Landsat mission, the Visible Infrared Imager Radiometer Suite (VIIRS) instrument on the next generation Joint Polar Satellite System (JPSS) and the thermal infrared instrument that has been proposed for Hyperspectral Infrared Imager (HypIRI).

Anticipated Benefits

N/A



Project Image ROE FY12 IRAD 172 CC Onboard Blackbody Calibrator Component Development for IR Remote Sensing Instrumentation

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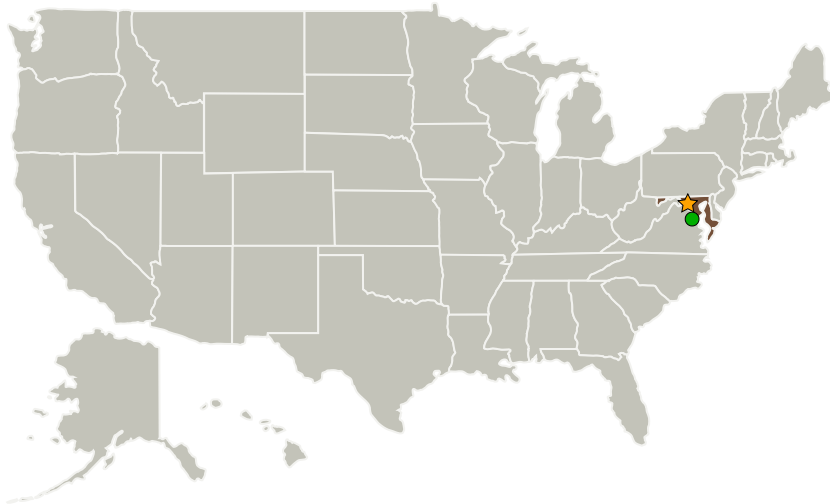
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Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★Goddard Space Flight Center(GSFC)	Lead Organization	NASA Center	Greenbelt, Maryland
●NASA Headquarters(HQ)	Supporting Organization	NASA Center	Washington, District of Columbia

Primary U.S. Work Locations

District of Columbia	Maryland
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Organizational Responsibility

Responsible Mission Directorate:

Mission Support Directorate (MSD)

Lead Center / Facility:

Goddard Space Flight Center (GSFC)

Responsible Program:

Center Independent Research & Development: GSFC IRAD

Project Management

Program Manager:

Peter M Hughes

Project Manager:

Michael J Amato

Principal Investigator:

Ramsey L Smith

Co-Investigators:

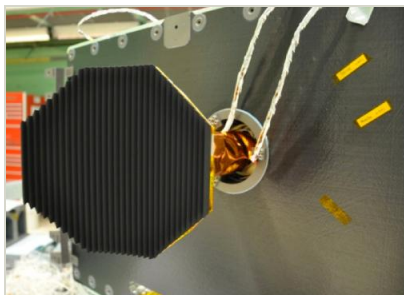
Synthia L Tonn
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Images



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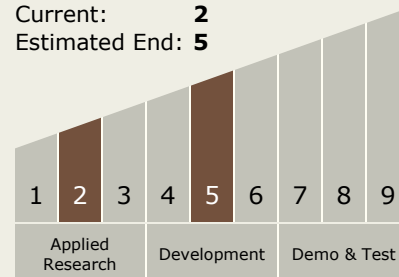
Project Image ROE FY12 IRAD 172
CC Onboard Blackbody Calibrator
Component Development for IR
Remote Sensing Instrumentation
(<https://techport.nasa.gov/image/1335>)

Project Website:

<http://aetd.gsfc.nasa.gov/>

Technology Maturity (TRL)

Start: 2
Current: 2
Estimated End: 5



Technology Areas

Primary:

- TX08 Sensors and Instruments
 - TX08.1 Remote Sensing Instruments/Sensors
 - TX08.1.4 Microwave, Millimeter-, and Submillimeter-Waves